

CHAPTER 2. PROGRAMMED PAINTING

Section 1. GENERAL

2.1.1 PURPOSE. Programmed painting is a systematic process for establishing when painting is required, what painting should be done, by whom, with what materials, at what time, and in what manner. Paint systems deteriorate and will lose their protective ability unless the film is intact. The principal objective of painting is to prevent deterioration of the substrate at a minimum cost per square foot per year. One procedure frequently used for providing protection has been to completely repaint after the original coating has failed. This failure results in an unsightly surface, expensive preparation before repainting, and possible deterioration of structural members. Another procedure is to completely repaint by applying two and even three coats at arbitrary intervals. This may be too late in cases where deterioration has already taken place, but completely unnecessary in others. Extensive surface preparation will be required in the first case, and film thickness will eventually become excessive in the latter case, leading to early failure by cracking and peeling. The most practical method of protection, therefore, is a continuous program of inspection, and painting as necessary. By means of programming and careful recordkeeping, a history of past performance is accumulated which aids materially in selecting the best paint systems and painting procedures.

2.1.2 ECONOMICS. Systematic inspection and recordkeeping, and programmed painting, rigidly carried out and established on a routine basis, result in significantly lower cost of protection per square foot per year.

2.1.2.1 Preventive Maintenance. Applied paint systems do not deteriorate uniformly. Even when they are applied by skilled painters, some pinholes, holidays, and breaks at sharp edges or seams are often present. Left untouched, corrosion and deterioration will start at these points, eventually undermining the coating and then spreading to adjacent areas. Furthermore, as corrosion increases, it does so at an accelerated rate until large areas of the surface are left unprotected. Programed painting enforces inspection and work scheduling to provide for relatively easy spotpainting of these minor breaks in the film long before any serious harm is done. Spotpainting describes the painting of only the small or localized areas in which the coating has begun to deteriorate. Not only does spotpainting save costly surface preparation and repainting of large areas, but the life expectancy of the paint system and structure can be extended considerably. Furthermore, when repainting is desired to achieve adequate film thickness or for uniform appearance, it can be accomplished economically with the minimum number of coats, since the surface will be in sound condition. An added advantage derived from preventive maintenance is the detection of faulty structural conditions or problems caused by leakage or moisture before they become serious due to oversight.

2.1.2.2 Painting Crew. Programmed painting accounts for substantial savings in manpower costs. Advanced scheduling of maintenance painting results in more efficient distribution of work loads and tends to eliminate both slack periods and crash programs. Painting crews can be used more efficiently by having their work laid out in advance, considering the season of the year, the weather, as well as types of jobs to be handled. For example, work should be scheduled in such a manner so as to have exterior surfaces painted in warm

weather; when cold weather sets in, the painting crews should be employed indoors. Thus, slack periods will be substantially reduced.

2.1.2.3 Painting Costs. Systematic inspection and recordkeeping will lead to the selection of paint materials that provide optimum protection for the particular surface and environment, as well as aiding in the selection of more efficient equipment and procedures for surface preparation and application. Consequently, the total cost of paint materials, surface preparation and application will be less per year of service. Furthermore, the use of the proper coatings based on past performance (from actual records) will result in longer service life and thus establish lower maintenance costs.

2.1.2.4 Example. The economic advantages of programmed versus nonprogrammed painting costs have been compared for one industrial establishment. During the first 5 years of the period analyzed, painting costs per year varied from a high of \$520,000 to a low of \$280,000, averaging over \$380,000. During the next 5-year period, after a thorough analysis of the painting requirements, a planned program of maintenance painting was undertaken with a resultant decrease in average cost of \$80,000 per year. Furthermore, projected cost savings indicated that, during the next 5-year period, painting costs would be further reduced to a level of approximately one half of the initial annual coverage or an overall saving of almost \$200,000 per year.

2.1.3 EFFICIENCY. Painting programs are based on defining what must be accomplished, using available manpower, setting realistic completion dates, improving performance based on historical records, and constantly seeking to prevent wasted effort resulting from ignorance, procrastination, and chance. Work is laid out so that projects can be carried out throughout the year with due consideration to weather and other conditions. Paint materials are chosen as a result of past performance based on accurate records, thus eliminating guesswork and the possible choice of improper materials for the surface being painted or its environment.

Section 2. PROCEDURE

2.2.1 INSPECTION AND REPORTING. One of the important aspects of programmed painting is the examination of the nature and condition of all surfaces before, during, and after painting. It is important that the inspector be trained in this respect and that this function be one of his primary responsibilities. Success of the entire program depends on correct detailed inspection and reporting done on a systematic and continuous basis.

2.2.1.1 Inspection. All painted structures should be inspected at definite intervals. Inspection intervals of approximately six months intervals should be considered under certain conditions such as: corrosive environments, areas where heavy traffic may cause rapid wear (floor finishes or airfield pavement markings), and areas where sanitation is important. Other areas should be inspected at approximately yearly intervals. The inspector should observe their condition with reference to type and stage of deterioration and make recommendations for spotpainting, repainting, or more frequent inspection. Inspections should also be made during all stages of painting and immediately after the job is finished.

2.2.1.2 Reporting. It is important that all findings be reported in written form. Descriptions and area calculations must be specific and consistent. Setting definite standards for such reports is vital if they are to have meaning and value for future reference. Provisions should be made to ensure that the information requested is sufficient to result in a report that covers, fully and accurately, all factors of importance for future planning. For guidance, see sample Performance Record in Appendix B-3.

2.2.2 PROJECT PREPARATION. Data from the Performance Record will determine the necessity for spotpainting or complete repainting. The next step is to determine the painting materials required, depending on the surface and environment, type, and extent of surface preparation, equipment for both surface preparation and application, manpower time required and possible hazards due to area location. The final step is to phase this project into the overall program considering seasonal conditions if the location is exposed and other factors, which may affect paint schedules. A typical Project Planning form is shown in Appendix B-1.

2.2.2.1 Priority. Assign maintenance painting project priorities in the following order:

First--Preventive maintenance painting, i.e., spotpainting of coatings that are basically sound.

Second--Repainting of surfaces which require refinishing but do not require extensive surface preparation.

Third--Repainting of surfaces which require both extensive surface preparation and refinishing.

The deciding factor for selecting the above priority list is which job offers the greatest return in relation to the time spent on it, and which represents the greatest loss if delayed. Spotpainting and refinishing without extensive surface preparation can be done relatively quickly and at low cost. However, any significant delay will result in the necessity of costly surface preparation due to the probability of an accelerated increase in corrosion or deterioration. Surfaces which require refinishing but have not deteriorated in any areas present no problem, and their repainting can be meshed into the overall program to fit in with the work schedule considering weather conditions (see 2.2.3.1). However, repainting should be done before any deterioration does begin. On the other hand, a delay of even a few months before repainting a badly deteriorated coating will not significantly affect service life or the cost of repainting. Complete surface preparation and repainting will be required regardless of when the work is scheduled.

2.2.2.2 Contractors and In-house Crew. It is preferable to have a permanent staff of skilled painters who can be kept busy the year round. Contractors should be used for seasonal painting, for painting large areas, and for jobs where special skills or equipment are required. The in-house crew should be used to carry out the preventive maintenance program on a continuing basis, for painting interiors and exteriors as appropriate, for painting small items and areas, and for general housekeeping painting.

2.2.3 SCHEDULING. Work should be scheduled sufficiently in advance to adequately ensure time to coordinate manpower, materials, and equipment. Work crews who do not have on hand the necessary paint or equipment to start and complete the assignment are being wasted. Other projects are thus delayed so that the entire program suffers. Effective scheduling provides for the orderly assignment of work based on need for the work, availability of manpower, materials, and equipment, seasonal nature of the work, and weather conditions.

2.2.3.1 Seasons and Weather Conditions. Since painting can be delayed by weather, scheduling for exterior painting must take into consideration seasonal and climatic conditions. Schedules should be arranged so as to allow diversion of crews to inside work or special projects in the event of inclement weather. For current weather conditions--for periods up to 1 month--the base weather officer or local meteorologist should be consulted. For longer range planning and/or scheduling, such as would be required in the submission of a bid, a climatological consultant should be retained. For military organizations and those contractors with defense contracts, climatological consultant services may be obtained from the USAF Environmental Technical Applications Center, Building 159, Navy Yard Annex, Washington, DC 20333 or the appropriate military weather service. (Requests for support of nonmilitary governmental painting projects should be directed to National Oceanographic and Atmospheric Administration, U.S. Department of Commerce, Washington Science Center, Rockville, MD 20852. Request for weather data at sites of a nongovernmental interest should be obtained from a private consulting meteorologist. A list of their names and addresses may be obtained from the American Meteorological Society, 45 Beacon Street, Boston, MA 02108.)

2.2.3.2 Preparation of Schedules. The preparation of painting schedules should only be undertaken by personnel experienced in estimating the exact demands of a given project. Inaccurate scheduling that falls far short of the mark, i.e., under or over estimating time to complete a job, can lead to considerable confusion and loss of efficiency. Too little time allotted to a job encourages shortcuts and omission of important procedures, in an effort to catch up to the time table. If too much time is allotted to a job, workmen either slow down or finish ahead of time and waste what would normally be productive time waiting for a new assignment. Inasmuch as the cost of labor is by far the major part of the total cost of the job, such slack periods are extremely uneconomical. In addition, other structures may reach more advanced stages of deterioration while the painting crew is tied up with prior commitments. (See planning form in Appendix B-1.)

2.2.4 INSPECTION DURING APPLICATION. Continuing and systematic inspection of each job is necessary even when correct paint systems have been selected and properly applied. Such inspection is the best method of determining the value of the paint job. Inspect jobs daily as they progress and immediately upon completion. Check materials to be used, environmental conditions, and condition of the surface before painting is started. Then check each coat for spreading rate, film thickness, and cure. The finished job should then be inspected for gloss and general appearance. A typical Daily Project Report is shown in Appendix B-2.

2.2.5 PERFORMANCE INSPECTION. Regular inspection of painted areas on a definite schedule is of utmost importance. By this means, deterioration can

be detected before it becomes widespread. Then, spotpainting can be accomplished at low cost, rather than having to do a complete paint job. Check all painted surfaces with respect to changes in appearance and for degree of deterioration. Recommendations can then be made for the painting required, if any. A typical Performance Record is shown in Appendix B-3.

2.2.6 HISTORICAL RECORDS. Accurate records of paint jobs which have been carried out are the best means of determining the best paint system for a particular surface and environment. There is no short cut for actual experience in the field. A typical Historical Painting Record is shown in Appendix B-4.

2.2.7 RECORDS AND DATA. It is extremely important to properly and continuously record all observations made of the conditions of the surface and environment, the paint system used, surface preparation, application, appearance, and long-range performance. In addition, include information on costs and man-hours involved. Do not try to save time and effort by cutting corners. Although omission of information will save time initially, it will make the records much less valuable in the future. The following typical forms for recording data are shown in Appendix B:

B-1 "Project Planning" (to be used for setting up painting projects)

B-2 "Daily Project Report" (to be used for inspection before, during, and after completion of painting projects)

B-3 "Performance Record" (to be used for continual inspection of painted structures)

B-4 "Historical Record" (to be used to keep a continuous record of painting jobs on each structure).

2.2.8 EVALUATION. The main reason for gathering data and maintaining records is to use the information to arrive at meaningful evaluations of completed jobs and to determine methods of improvement or cost reduction on future jobs. These records can be used:

a. To determine the effectiveness of a particular paint system on different surfaces or in varying environments.

b. To compare different paint systems under similar conditions.

c. To compare the use of different equipment for surface preparation or application.

d. To determine manpower efficiency under varying conditions.

e. As a basis for the use of better or lower cost paint systems on planned jobs.

f. As a basis for more efficient use of manpower and equipment on planned jobs.

g. To determine frequency of spot painting and repainting.

The proper use of records tightens guidelines and replaces haphazard action and guesswork with purposeful direction and planning. Goals can be established realistically and with confidence based on recorded experience. The ultimate result is a systematic program of preventive maintenance inspections and painting which provides an economical and efficient means of protecting facilities.